

## General

### Guideline Title

Practice parameters for the respiratory indications for polysomnography in children.

### Bibliographic Source(s)

Aurora RN, Zak RS, Karippot A, Lamm CI, Morgenthaler TI, Auerbach SH, Bista SR, Casey KR, Chowdhuri S, Kristo DA, Ramar K. Practice parameters for the respiratory indications for polysomnography in children. *Sleep*. 2011;34(3):379-88. [150 references] [PubMed](#)

### Guideline Status

This is the current release of the guideline.

## Recommendations

### Major Recommendations

The levels of evidence (1-4) and levels of recommendation (standard, guideline, option) are defined at the end of the "Major Recommendations" field.

#### Methodology

1. Polysomnography in children should be performed and interpreted in accordance with the recommendations of the American Academy of Sleep Medicine (AASM) Manual for the Scoring of Sleep and Associated Events. (Standard)

#### Diagnostic Indications for Polysomnography in Sleep Related Breathing Disorders

1. Polysomnography (PSG) is indicated when the clinical assessment suggests the diagnosis of obstructive sleep apnea syndrome in children. (Standard)
2. Polysomnography is indicated when the clinical assessment suggests the diagnosis of congenital central alveolar hypoventilation syndrome or sleep related hypoventilation due to neuromuscular disorders or chest wall deformities. It is indicated in selected cases of primary sleep apnea of infancy. (Guideline)
3. Nap (abbreviated) polysomnography is not recommended for the evaluation of obstructive sleep apnea syndrome in children. (Option)
4. Polysomnography is indicated when there is clinical evidence of a sleep related breathing disorder in infants who have experienced an apparent life-threatening event (ALTE). (Guideline)

#### Indications for Preoperative Polysomnography

1. Polysomnography is indicated in children being considered for adenotonsillectomy to treat obstructive sleep apnea syndrome. (Guideline)

## Indications for Polysomnography to Assess Response to Treatment

1. Children with mild obstructive sleep apnea syndrome preoperatively should have clinical evaluation following adenotonsillectomy to assess for residual symptoms. If there are residual symptoms of obstructive sleep apnea syndrome, polysomnography should be performed. (Standard)
2. Polysomnography is indicated following adenotonsillectomy to assess for residual sleep related breathing disorder in children with preoperative evidence for moderate to severe obstructive sleep apnea syndrome (OSAS), obesity, craniofacial anomalies that obstruct the upper airway, and neurologic disorders (e.g., Down syndrome, Prader-Willi syndrome, and myelomeningocele). (Standard)
3. Polysomnography is indicated after treatment of children for obstructive sleep apnea syndrome with rapid maxillary expansion to assess for the level of residual disease and to determine whether additional treatment is necessary. (Option)
4. Children with OSAS treated with an oral appliance should have clinical follow-up and polysomnography to assess response to treatment. (Option)
5. Polysomnography is indicated for positive airway pressure (PAP) titration in children with obstructive sleep apnea syndrome. (Standard)
6. Polysomnography is indicated for noninvasive positive pressure ventilation (NIPPV) titration in children with other sleep related breathing disorders. (Option)
7. Follow-up PSG in children on chronic PAP support is indicated to determine whether pressure requirements have changed as a result of the child's growth and development, if symptoms recur while on PAP, or if additional or alternate treatment is instituted. (Guideline)
8. Children treated with mechanical ventilation may benefit from periodic evaluation with polysomnography to adjust ventilator settings. (Option)
9. Children considered for treatment with supplemental oxygen do not routinely require polysomnography for management of oxygen therapy. (Option)
10. Children treated with tracheostomy for sleep related breathing disorders benefit from polysomnography as part of the evaluation prior to decannulation. These children should be followed clinically after decannulation to assess for recurrence of symptoms of sleep related breathing disorders. (Option)

## Indications for Polysomnography in Respiratory Diseases

1. Polysomnography is indicated in the following respiratory disorders only if there is a clinical suspicion for an accompanying sleep related breathing disorder: chronic asthma, cystic fibrosis, pulmonary hypertension, bronchopulmonary dysplasia, or chest wall abnormality such as kyphoscoliosis. (Option)

### Definitions:

#### Levels of Evidence

1 Evidence provided by a prospective study in a broad spectrum of persons with the suspected condition, using a reference (gold) standard for case definition, where test is applied in a blinded fashion, and enabling the assessment of appropriate test of diagnostic accuracy. All persons undergoing the diagnostic test have the presence or absence of the disease determined. Level 1 studies are judged to have a low risk of bias.

2 Evidence provided by a prospective study of a narrow spectrum of persons with the suspected condition, or a well-designed retrospective study of a broad spectrum of persons with an established condition (by "gold standard") compared to a broad spectrum of controls, where test is applied in a blinded evaluation, and enabling the assessment of appropriate tests of diagnostic accuracy. Level 2 studies are judged to have a moderate risk of bias.

3 Evidence provided by a retrospective study where either person with the established condition or controls are of a narrow spectrum, and where the reference standard, if not objective, is applied by someone other than the person that performed (interpreted) the test. Level 3 studies are judged to have a moderate to high risk of bias.

4 Any study design where test is not applied in an independent evaluation or evidence is provided by expert opinion alone or in descriptive case series without controls. There is no blinding or there may be inadequate blinding. The spectrum of persons tested may be broad or narrow. Level 4 studies are judged to have a very high risk of bias.

#### Levels of Recommendations

Standard: This is a generally accepted patient-care strategy that reflects a high degree of clinical certainty and generally implies the use of Level 1 evidence, which directly addresses the clinical issue, or overwhelming Level 2 evidence.

Guideline: This is a patient-care strategy that reflects a moderate degree of clinical certainty and implies the use of Level 2 evidence or a consensus

of Level 3 evidence.

Option: This is a patient-care strategy that reflects uncertain clinical use and implies either inconclusive or conflicting evidence or conflicting expert opinion.

Adapted from Eddy DM (Ed.). A manual for assessing health practices and designing practice policies: the explicit approach. Philadelphia, PA: American College of Physicians; 1992.

## Clinical Algorithm(s)

None provided

## Scope

## Disease/Condition(s)

Sleep related breathing disorders:

- Obstructive sleep apnea syndrome
- Other respiratory disorders including chronic asthma, cystic fibrosis, pulmonary hypertension, bronchopulmonary dysplasia, or chest wall abnormality such as kyphoscoliosis

## Guideline Category

Diagnosis

Evaluation

## Clinical Specialty

Family Practice

Neurology

Otolaryngology

Pediatrics

Pulmonary Medicine

Sleep Medicine

## Intended Users

Advanced Practice Nurses

Health Care Providers

Physician Assistants

Physicians

Respiratory Care Practitioners

## Guideline Objective(s)

To address indications for polysomnography in children with suspected sleep related breathing disorders

## Target Population

Children with suspected sleep related breathing disorders

## Interventions and Practices Considered

Polysomnography

Note: Nap (abbreviated) polysomnography was considered but not recommended.

## Major Outcomes Considered

Validity, reliability, and clinical utility of pediatric polysomnography

## Methodology

### Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

### Description of Methods Used to Collect/Select the Evidence

Literature Search Strategy

The task force divided the project into three broad sections and developed searches that correspond to topical categories. The Sleep Related Breathing Disorders (SRBD) section includes evaluation of studies that provide data regarding validity or reliability of polysomnography (PSG) for characterization of breathing during sleep in children, clinical utility of PSG in children with risk factors for SRBD (a "risk stratification" strategy), clinical utility of PSG prior to adenotonsillectomy (AT) or other surgical procedures, and clinical utility of PSG for assessment of infants less than 12 months of age with suspected SRBD. The Other Chronic Respiratory Disorders section includes clinical utility of PSG in children with chronic obstructive pulmonary disease and chronic restrictive lung disease. The final section on clinical utility of PSG for therapeutic intervention includes evaluation of PSG to initiate positive airway pressure (PAP) in children with SRBD, and other potential therapeutic applications.

The task force developed search terms and search strategies suitable for queries of the medical literature using Medline. Explicit inclusion and exclusion criteria, search dates, and other search limitations were established to guide selection of relevant citations (summarized below).

#### *Inclusion Criteria*

- English language
- Human subjects
- Greater than or equal to 10 subjects for obstructive sleep apnea syndrome (OSAS) or central sleep apnea (CSA) papers, and greater than or equal to 5 subjects for other respiratory papers
- Less than 18 years of age

*Search Dates:* 1966 through March 27, 2009

A full listing of search terms is provided on the American Association of Sleep Medicine (AASM) website ([www.aasmnet.org](http://www.aasmnet.org))

[REDACTED]). Following performance of the literature search, a master list of candidate papers was assembled. Task force members reviewed all candidate citations by title and abstract to identify papers that met inclusion criteria and to exclude papers with exclusionary features. At least 2 task force members reviewed each citation to determine acceptance, and the task force chair provided final resolution when task force members differed in their recommendation. Accepted papers were allocated to the appropriate section or sections of the review paper. A second pathway for consideration of candidate papers involved the process known as "pearling." Pearling involves identification of relevant papers by examination of the references cited in papers deemed to be relevant or through a task force member's personal knowledge of a paper. Pearling identifies relevant papers that were not identified through the formal Medline search process. Papers identified through pearling were evaluated by at least 2 task force members in the same fashion as other papers.

## Number of Source Documents

Approximately 3500 candidate papers were identified and screened, and 243 papers were selected for inclusion.

## Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

### Rating Scheme for the Strength of the Evidence

Levels of Evidence

1 Evidence provided by a prospective study in a broad spectrum of persons with the suspected condition, using a reference (gold) standard for case definition, where test is applied in a blinded fashion, and enabling the assessment of appropriate test of diagnostic accuracy. All persons undergoing the diagnostic test have the presence or absence of the disease determined. Level 1 studies are judged to have a low risk of bias.

2 Evidence provided by a prospective study of a narrow spectrum of persons with the suspected condition, or a well-designed retrospective study of a broad spectrum of persons with an established condition (by "gold standard") compared to a broad spectrum of controls, where test is applied in a blinded evaluation, and enabling the assessment of appropriate tests of diagnostic accuracy. Level 2 studies are judged to have a moderate risk of bias.

3 Evidence provided by a retrospective study where either person with the established condition or controls are of a narrow spectrum, and where the reference standard, if not objective, is applied by someone other than the person that performed (interpreted) the test. Level 3 studies are judged to have a moderate to high risk of bias.

4 Any study design where test is not applied in an independent evaluation or evidence is provided by expert opinion alone or in descriptive case series without controls. There is no blinding or there may be inadequate blinding. The spectrum of persons tested may be broad or narrow. Level 4 studies are judged to have a very high risk of bias.

## Methods Used to Analyze the Evidence

Systematic Review with Evidence Tables

### Description of the Methods Used to Analyze the Evidence

Data Extraction and Evidence Grading Process

Data extraction and evidence grading forms were developed to provide a standardized approach for summarizing relevant data and grading the strength of evidence. The process of data extraction and evidence grading followed a 2-step process, similar to that used in other recent American Academy of Sleep Medicine (AASM) evidence-based review projects. Each paper was assigned for primary and secondary review. Because of the large number of papers identified, with the approval of the Standards of Practice Committee (SPC) and the AASM Board of Directors, the task force identified a group of sleep specialists to serve as primary reviewers to perform the initial data extraction and initial evidence grading for accepted papers. In preparation for performing these functions, all primary reviewers were oriented to the AASM evidence-based review process and to the objectives of this project. The task force chair and AASM support personnel conducted a series of training sessions via teleconference

that included the approach to analysis of papers, completion of the data extraction form, and determination of level of evidence. Prior to beginning work on this project, all primary reviewers participated in reviewing, extracting, and grading evidence using a training set of papers, and their performance was evaluated by the task force chair to insure competency.

All papers were then reviewed by at least 1, and often 2 or more, task force members. Papers were reviewed and graded with respect to the operating characteristics of polysomnography (PSG), which differed in some cases from the primary objectives of the paper. Task force members were charged with reviewing and modifying responses on the data extraction and evidence grading forms. When significant discrepancies occurred with evidence grading between primary and secondary reviewers, the task force chair reviewed and resolved these differences.

The data extraction and evidence grading form for this project is available for review on the AASM website ([www.aasmnet.org](http://www.aasmnet.org) ). The form includes description of study design, assessment of potential sources of bias or systemic error including sample sizes, degree of blinding, referral sources, funding sources, and whether the study included a broad or narrow spectrum of subjects relative to the topic of interest. A study was considered to have a broad spectrum when the range of eligible subjects included mild through severe disease plus subjects presumed to have no disease (normal controls). A study was considered to have a narrow spectrum when the range of eligible subjects was limited to those with signs or symptoms of the disease or a restricted subgroup of those with the disease, and limited or no representation of subjects without disease (normal controls).

Assessment of evidence level was challenging for several reasons. Because this project involved evaluation of validity, reliability, and clinical utility of a diagnostic procedure rather than evaluation of therapeutic trials, the task force elected to use a classification of evidence that differed from the previous AASM system. The task force evaluated a number of evidence grading systems and performed pilots of the candidate systems using a subset of papers selected for this project. After assessment, and with approval from the SPC, the task force elected to use an evidence grading system developed by the American Academy of Neurology (AAN) for assessment of clinical utility of diagnostic tests. The system involves 4 tiers of evidence, with Level 1 studies judged to have a low risk of bias and Level 4 studies judged to have a very high risk of bias. A lower level of evidence does not indicate a flawed study but refers to weaker scientific evidence and greater potential bias. Weaker levels of evidence indicate the need to integrate greater clinical judgment when applying the results to clinical decision making. The task force's assessment of data takes into account not only the levels of evidence in relevant papers, but also the number of papers identified, the magnitude and direction of various findings, and whether papers demonstrate convergent or divergent conclusions.

After completion of the review, data extraction and evidence grading for each paper, key data were entered into an Evidence Table to summarize findings. The Evidence Table is provided on the AASM website ([www.aasmnet.org](http://www.aasmnet.org) ).

## Methods Used to Formulate the Recommendations

### Expert Consensus

## Description of Methods Used to Formulate the Recommendations

The Standards of Practice Committee of the American Academy of Sleep Medicine (AASM), in conjunction with specialists and other interested parties, developed these practice parameters based on the review paper accompanying the original guideline document (see the "Availability of Companion Documents" field). A task force of content experts was appointed by the AASM in 2007 to review and grade evidence in the scientific literature regarding the validity, reliability, and clinical utility of polysomnography (PSG) in pediatric sleep disorders. In most cases recommendations are based on evidence from studies published in the peer reviewed literature or on generally accepted patient care strategies. When scientific data were absent, insufficient or inconclusive, the Rand/UCLA Appropriateness Method was used to develop consensus recommendations by identifying the collective opinion of the Standards of Practice Committee (SPC) and task force. The Rand/UCLA Appropriateness Method combines the best available scientific evidence with the collective judgment of experts to yield statements regarding the appropriateness of performing procedures. In particular, it involves development of a list of specific indications derived from the scientific evidence. Completion of rating sheets that evaluated the appropriateness of these indications was conducted in 2 rounds by members from both the SPC and task force. Based on these ratings, indications were classified as appropriate, uncertain, or inappropriate. Indications that were classified as appropriate were used to develop these recommendations; indications that were uncertain or inappropriate were rejected.

## Rating Scheme for the Strength of the Recommendations

### Levels of Recommendations

Standard: This is a generally accepted patient-care strategy that reflects a high degree of clinical certainty and generally implies the use of Level 1 evidence, which directly addresses the clinical issue, or overwhelming Level 2 evidence.

Guideline: This is a patient-care strategy that reflects a moderate degree of clinical certainty and implies the use of Level 2 evidence or a consensus of Level 3 evidence.

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## Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

## Method of Guideline Validation

Internal Peer Review

## Description of Method of Guideline Validation

The Board of Directors of the American Academy of Sleep Medicine approved these recommendations.

## Evidence Supporting the Recommendations

### Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

## Benefits/Harms of Implementing the Guideline Recommendations

### Potential Benefits

Appropriate use of polysomnography in children with sleep related breathing disorders

### Potential Harms

Not stated

## Qualifying Statements

### Qualifying Statements

- These practice parameters define principles of practice that should meet the needs of most patients in most situations. These guidelines should not, however, be considered inclusive of all proper methods of care or exclusive of other methods of care reasonably directed to obtaining the same results. The ultimate judgment regarding propriety of any specific care must be made by the physician, in light of the individual circumstances presented by the patient, available diagnostic tools, accessible treatment options, and resources.

- The American Academy of Sleep Medicine (AASM) expects these guidelines to have an impact on professional behavior, patient outcomes, and, possibly, health care costs. These practice parameters reflect the state of knowledge at the time of publication and will be reviewed, updated, and revised as new information becomes available.

## Implementation of the Guideline

### Description of Implementation Strategy

An implementation strategy was not provided.

## Institute of Medicine (IOM) National Healthcare Quality Report Categories

### IOM Care Need

Getting Better

Living with Illness

### IOM Domain

Effectiveness

Patient-centeredness

## Identifying Information and Availability

### Bibliographic Source(s)

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### Adaptation

Not applicable: The guideline was not adapted from another source.

### Date Released

2011 Mar

### Guideline Developer(s)

American Academy of Sleep Medicine - Professional Association

### Source(s) of Funding

## Guideline Committee

Standards of Practice Committee

## Composition of Group That Authored the Guideline

*Committee Members:* R. Nisha Aurora, MD; Rochelle S. Zak, MD; Anoop Karippot, MD; Carin I. Lamm, MD; Timothy I. Morgenthaler, MD; Sanford H. Auerbach, MD; Sabin R. Bista, MD; Kenneth R. Casey, MD; Susmita Chowdhuri, MD; David A. Kristo, MD; Kannan Ramar, MD

## Financial Disclosures/Conflicts of Interest

All members of the American Academy of Sleep Medicine (AASM) Standards of Practice Committee and Board of Directors completed detailed conflict-of-interest statements and were found to have no conflicts of interest with regard to this subject.

This was not an industry-supported study. Dr. Morgenthaler has received research support from ResMed. Dr. Auerbach has participated in research supported by Sepracor and participated in a speaking engagement for Forest Pharmaceuticals. Dr. Karippot has received research support from Wyeth and is Medical Director of Akane Sleep Solutions, Inc., a sleep disorders clinic and laboratory. The other authors have indicated no financial conflicts of interest.

## Guideline Status

This is the current release of the guideline.

## Guideline Availability

Electronic copies: Available in Portable Document Format (PDF) from the [American Academy of Sleep Medicine \(AASM\) Web site](#)

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Print copies: Available from the Standards of Practice Committee, American Academy of Sleep Medicine, 2510 North Frontage Road, Darien, IL 60561. Web site: [www.aasmnet.org](http://www.aasmnet.org) .

## Availability of Companion Documents

The following are available:

- Respiratory indications for polysomnography in children: an evidence-based review. Sleep 2011 March; 34(3):398A-398AW. Electronic copies: Available from the [American Academy of Sleep Medicine \(AASM\) Web site](#) .
- Executive summary of respiratory indications for polysomnography in children: an evidence-based review. Sleep 2011 March;34(3):389-398. Electronic copies: Available from the [AASM Web site](#) .

Print copies: Available from the Standards of Practice Committee, American Academy of Sleep Medicine, 2510 North Frontage Road, Darien, IL 60561. Web site: [www.aasmnet.org](http://www.aasmnet.org) .

## Patient Resources

None available

## NGC Status

This NGC summary was completed by ECRI Institute on August 8, 2011. The information was verified by the guideline developer on August 19, 2011.

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